BRAUDE
College of Engineering, Karmiel

Detection of Rare Coins

Software Engineering Department

Braude College

Capstone Project Phase A – 61998

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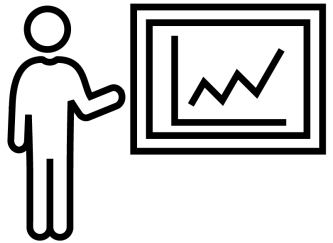
Introduction

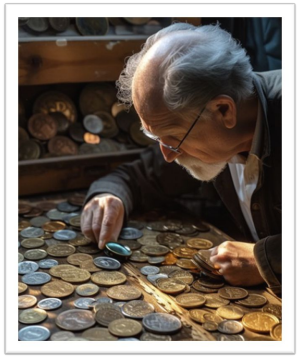
- Brief overview of rare coin detection.
- Importance of AI in solving this problem.
- Research objectives.



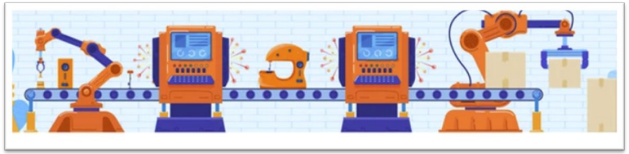
Problem Statement

Challenges in rare coin identification.

Limitations of manual methods.



Need for an automated system.



Proposed Solution

AI-based system overview

Model architecture

Key features

Methods Used in Our Application

Data Collection and Annotation:

- Collected 100 images of agorot coins.
- Annotated images to mark year stamps for training.

Preprocessing:

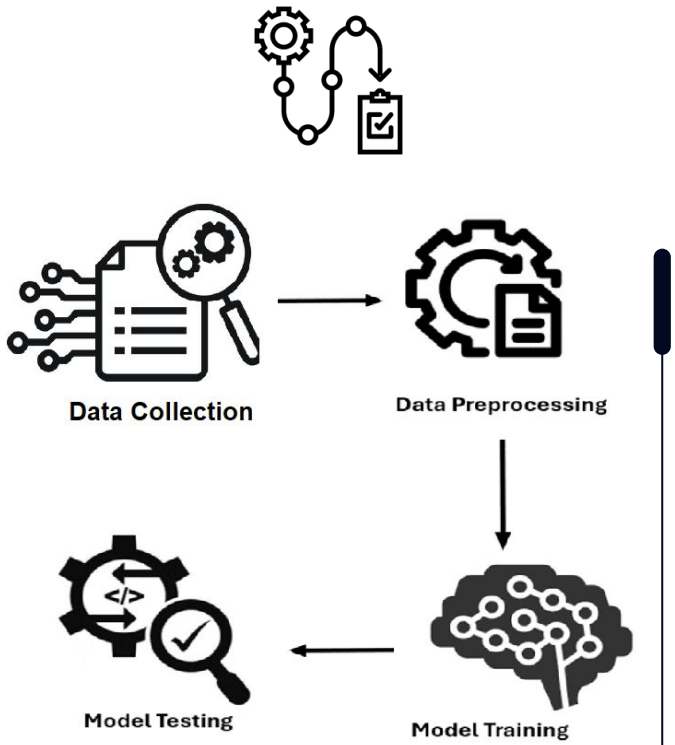
- Applied data augmentation (rotation, scaling, contrast adjustment).
- Used image segmentation to isolate coins from backgrounds.

Model Training:

- Used the YOLO object detection framework.
- Fine-tuned pre-trained YOLO weights with our dataset.

Evaluation and Testing:

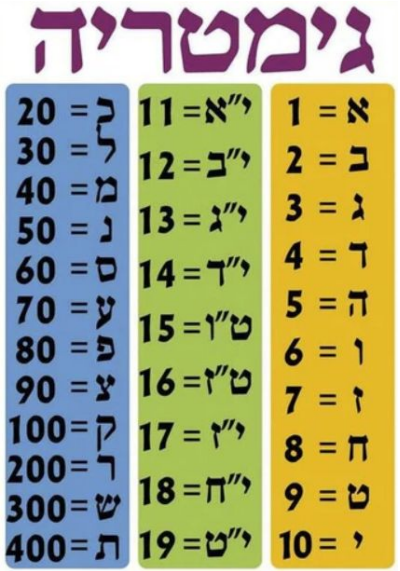
- Measured model performance with precision, recall, and F1 score.
- Tested on unseen data for generalization.
- Conducted real-time testing via video feed.



Converting Hebrew Year to Gregorian Year

Hebrew Letters and Their Numerical Values:

- The first nine letters represent the numbers 1 through 9:
  - א = 1, ב = 2, ג = 3, ד = 4, ה = 5, ו = 6, ז = 7, ח = 8, ט = 9
- The next nine letters represent the tens:
  - י = 10, כ = 20, ל = 30, מ = 40, נ = 50, ס = 60, ע = 70, פ = 80, צ = 90
- The remaining letters represent the hundreds:
  - ק = 100, ר = 200, ש = 300, ת = 400



Example: תשפ"ד

- ת = 400
- ש = 300
- פ = 80
- ד = 4

Total: 400+300+80+4=784. The thousands (5) are implied, so the year is 5784.

And now to make it into a civil year , we omit the first digit , and then we add 1240 , in our example is 784 + 1240 = 2024

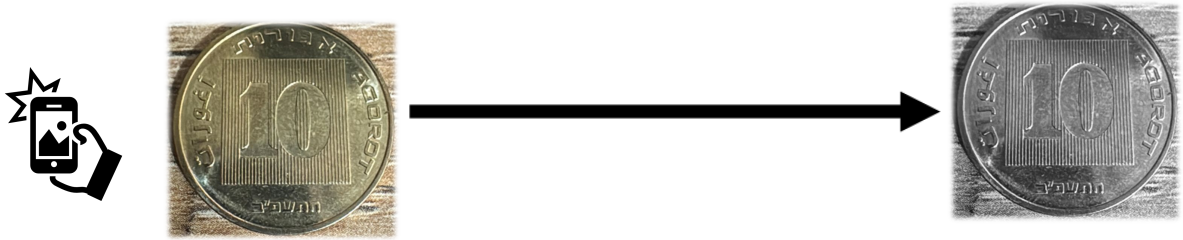
Data Flow in the Coin Detection System

Input:

- User captures an image or starts a video stream via the GUI.

Pre-processing:

- Image or video is pre-processed for optimal detection.



Coin Detection:

- Detection model identifies coins and extracts Hebrew letters stamped on them.

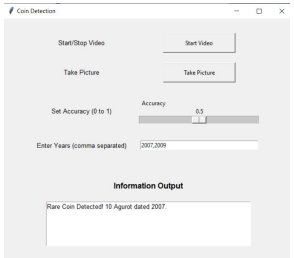
Classification & Extraction:

- Coins are classified by rarity, mint year, and other metadata.
- Hebrew year is converted to civil year using the previously explained algorithm.

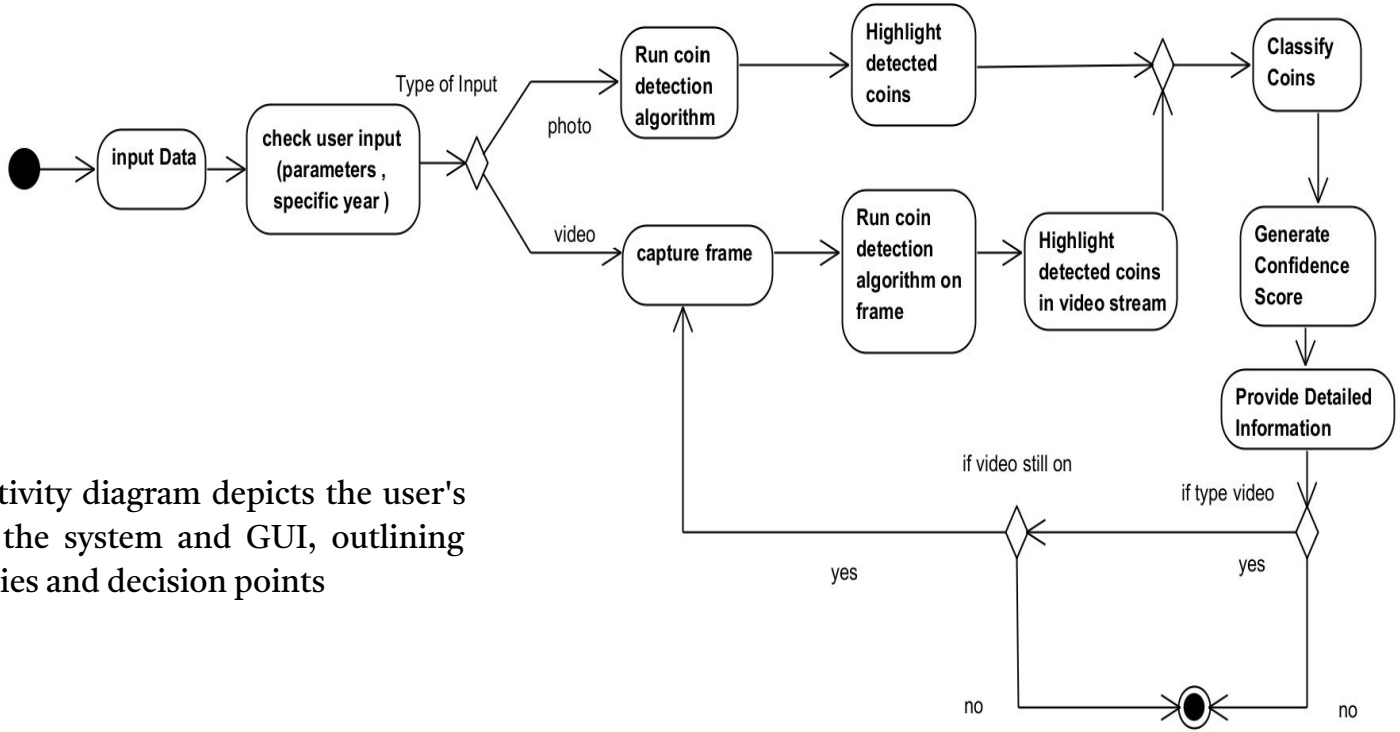
Output:

- Results are displayed in the console or GUI.

התשפ"ב → 2022 →



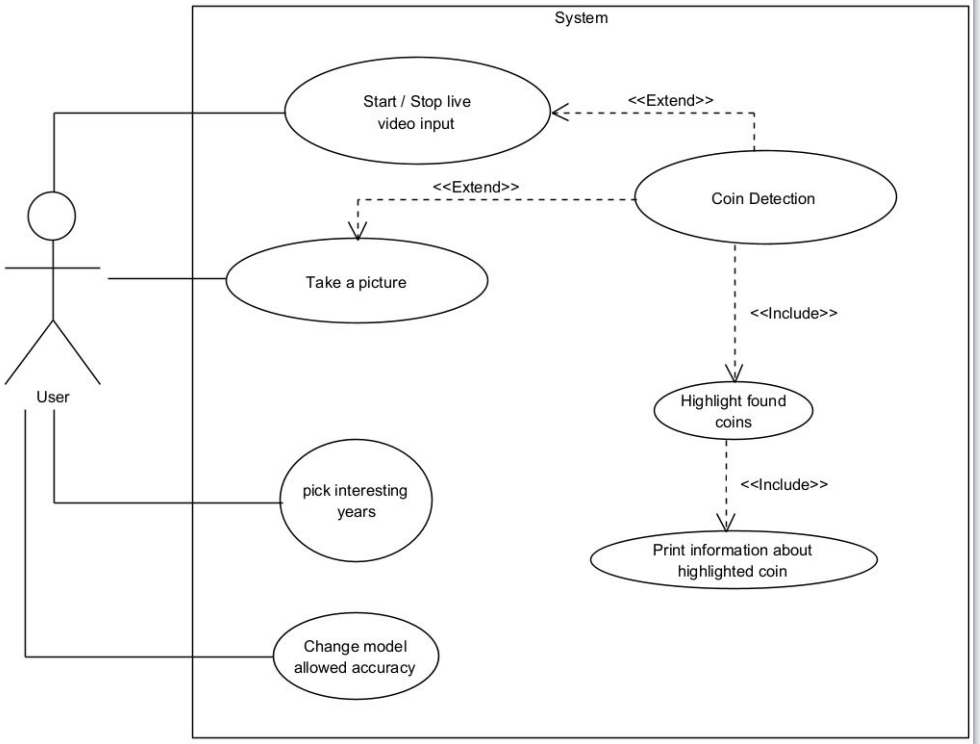
Activity Diagram



- The following activity diagram depicts the user's interaction with the system and GUI, outlining the flow of activities and decision points

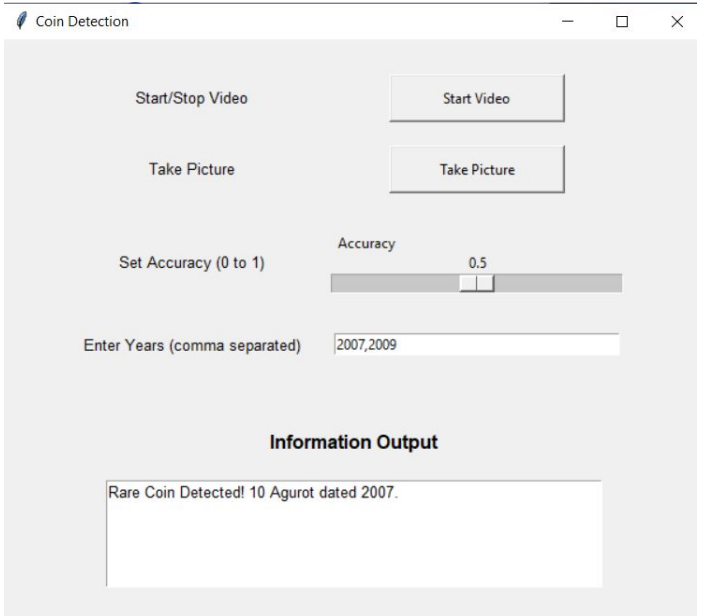
Use case

- The following Use Case diagram shows both the user and his interaction system

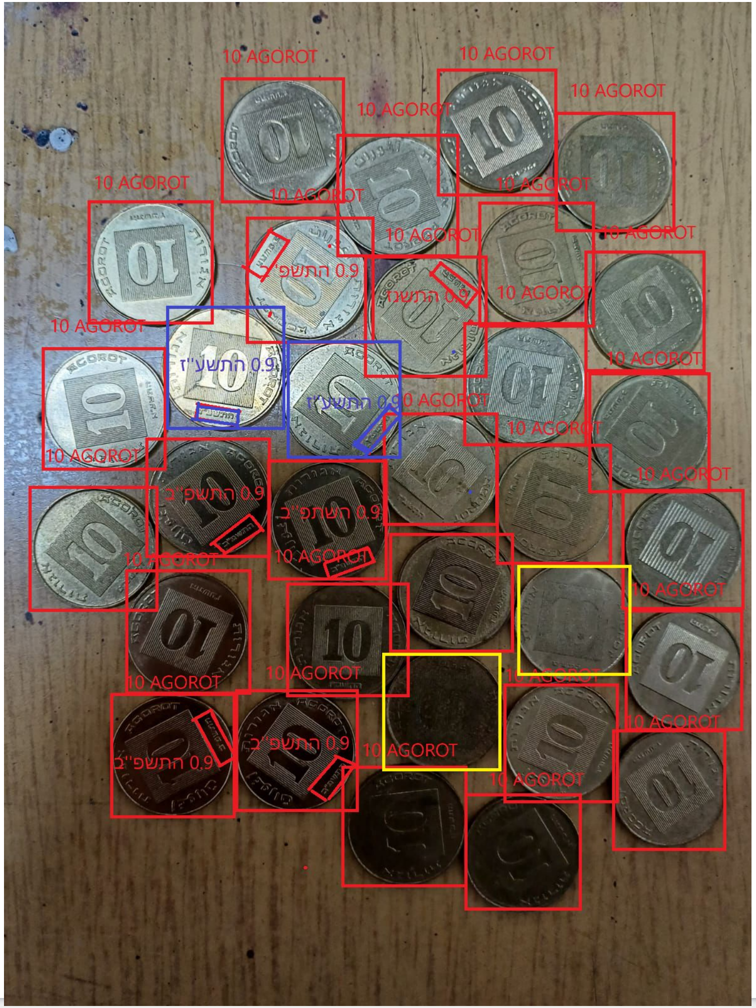


GUI

1. A button to start video mode.
2. A button to capture a photo and a button to process the given photo.
3. There will be a text box with the information after processing the coin.
4. In addition to a text box that tells the algorithm which years are needed.
5. A slider which gives the option to tell the algorithm the allowed accuracy of detection.



An example of the image after our algorithm ran on it , it highlights the coins that it found and also highlights the years of the coins that are required by the user


10 AGOROT
התשפ"ב 0.9
התשע"ז 0.9

Thank you
for listening!